

Exam

Production Planning & Quality Control

June 22, 2018 - 18.30-21.30h.

Topic 1: Lean Production (11 of 30 points)

QUESTION 1 (0 of 6 points)

According to Nicolas, rule 6 of pull production is: "The number of cards is gradually reduced to decrease work-in-process and expose areas that are wasteful and in need of improvement."

- a) Explain why reducing the number of cards lead to a decrease of work-in-process (3 points)
- b) Would this hold for (a) P-kanbans, (b) C-kanbans, or (c) both P-kanbans and C-kanbans? (3 points)

QUESTION 2 (6 of 6 points)

List the seven types of waste initially recognized by Toyota. (6 points)

QUESTION 3 (0 of 6 points)

Nicolas (2014) states that "lean production philosophy recognizes that for customers to acquire the best purchased items, it is often necessary for them to work with suppliers to help make them the best."

Which three aspects of the customer-supplier relationship are especially important according to Nicolas? (6 points)

QUESTION 4 (2 of 6 points)

You are determining the optimal block-based maintenance policy of your bottleneck machine. The cost of corrective maintenance at this machine is € 2200, and your preventive maintenance cost is € 320. You already determined that your empirical data nicely fits with a Weibull distribution with parameters $k = 2.9962$ and $\lambda = 10.1144$. You subsequently determined that the optimal maintenance interval is $T=4.34$ days with an $M(T)$ value of 0.076223.

- a) Calculate the mean cost per day by using the following formula (2 points):
- b) Calculate the expected number of times per year your machine would need corrective maintenance assuming that the machine is working full time (i.e., 365 days per year) and that you use the optimal block-based maintenance policy (4 points).

QUESTION 5 (3 of 6 points)

Define Kaizen and (radical/disruptive) innovation (3 points) and discuss how these two concepts are related (3 points).

Topic 2: Line Balancing (0 of 24 points)

QUESTION 6 (0 of 6 points)

Why should, according to Nicolas, the bottleneck be placed as close as possible to the start of the process in a flow line? (6 points)

QUESTION 7 (0 of 6 points)

Describe the main advantage and the main disadvantage of going from a process layout to cellular manufacturing. (6 points)

QUESTION 8 (0 of 12 points)

A production company wants to balance its production line. The tasks, task times and precedence-relations are given as follows:

Task	Task time (minutes)	Preceding tasks
A	8	
B	9	A
C	6	A
D	16	B, C
E	11	C
F	12	E
G	8	D

- a) Draw a precedence diagram of the tasks. (4 points)
- b) Propose a balanced line based on the assumption that demand is 40 per day and the factory operates 12 hours per day. Use either the longest operation time as discussed in the book, or the Rank Positional Weight procedure that was demonstrated during the lecture. (8 points)

Topic 3: A3 Report (11 of 24 points)

Nicholas defines the A3 Report as a simple one-page standardized document used in Toyota to report everything important about the analysis of the current situation (for example, in a production system) and the main conclusions drawn from such an analysis.

QUESTION 9 (4 of 8 points)

- a) What are the significant features of an A3 report? (Indicate how the A3 report is divided and how the main sections of the A3 are named) (4 points)
- b) How does creating an A3 report fit into the PDCA cycle of improvement? (4 points)

QUESTION 10 (4 of 4 points)

Company "Alpha" uses A3 reports. One of the company's A3 reports shows that the "Alpha" production system is characterized by large lot sizes.

- a) Mention one kind of waste that is caused by large lot sizes. (2 points)

- b) Mention one kind of waste that is caused by small lot sizes. (2 points)

QUESTION 11 (3 of 12 points)

Managers at “Alpha” think that large lot sizes are problematic for their production system, therefore they decided to reduce them by adopting the SMED tool.

- a) What does the acronym SMED stand for? (2 points)
- b) Why is SMED useful for reducing the lot size? (3 points)
- c) Which are the steps in SMED? (5 points)
- d) Name two advantages of SMED other than lot size reduction (2 points)

Topic 4: Green Supply Chain Management (0 of 12 points)

QUESTION 12 (0 of 2 points)

For environmental scientists, August 2, 2017 signifies an illustrative calendar date. What happened on August 2, 2017? (2 points)

Nb. The same event took place on August 8, 2016; August 13, 2015; August 19, 2014; and several other dates in the past.

QUESTION 13 (0 of 4 points)

During the lecture about Green Supply Chain Management five reasons were addressed why eco-regulations can induce eco-efficiency and encourage eco-innovation (eco-effectiveness) that help improve commercial competitiveness of companies and their supply chains. Name and explain four of these reasons. (4 points)

QUESTION 14 (0 of 6 points)

Philips has introduced a new business model to supply lightning for offices and buildings to some of their customers. With the traditional business model Philips' customers purchase lightbulbs, LED lights and other types of lighting apiece or in larger quantities (bulk purchasing or wholesale). With the new 'pay-per-lux' business model customers buy lighting as a service and customers pay Philips an all-in fee for the amount of lux needed to light its offices or buildings. This all-in fee includes cost of materials (e.g., LED lighting), maintenance and replacement costs, and the costs of electricity consumption. With the 'pay-per-lux' model the customer does not own the lightning; instead, the ownership of the lightning resides with Philips.

- a) Explain what incentives the traditional business model gives to Philips in terms of designing, producing and selling lighting, and explain why these incentives do not stimulate Philips to make and sell more environmentally-friendly lighting. (3 points)
- b) Explain why Philips' new pay-per-lux model can be more beneficial from an environmental point of view. (3 points)

*** End of the exam ***